Desired Fertility, Actual Fertility and the Effects of China's Universal Two-Child Policy*

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Abstract

This paper evaluates the impact of China's Universal Two-Child (UTC) policy on fertility outcomes using nationally representative survey data. We find that the UTC policy led to only a modest increase in births among eligible women by 0.025. This effect was predominantly driven by women whose fertility desire exceeds one child, highlighting that maternal fertility desire, rather than fertility restrictions, is the primary factor behind China's rapid decline in birth rates following the abolition of the One-Child Policy. We assess the medium-term policy effect based on respondents' reported fertility plans in subsequent years. Our results indicate that the policy effect peaked in the first two years and then declined rapidly as the pent-up demand for births waned. Additionally, we find that childrearing costs, proxied by housing prices, negatively impacted the effectiveness of the UTC policy, and the dampening effect of housing price was more pronounced for women without urban housing ownership. The aggregated effect of the UTC policy is equivalent to approximately 4.1% of China's average births during 2016−2017, which only released about 16.6% of China's fertility potential. Future policies to address the persistent decline in birth rates should focus on reducing childrearing costs and sustaining fertility desires.

Keywords: Desired Fertility, Actual Fertility, China's Universal Two-Child Policy, Housing Price
JEL: J11, J13, J18

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1. Introduction

Globally the fertility rate has declined to below-replacement level, which harbingers significant demographic shifts and associated challenges, as well as broader socioeconomic transitions (Spears and Geruso, 2025). Part of the fertility decline is a result of demographic transition associated with economic development; however, the underlying reasons behind the trend of low and declining fertility to be below-replacement level remain insufficiently understood. Is this decline primarily driven by government policies that restrict family size, or does it stem from socioeconomic changes that alter women's desires regarding childbearing?

In many developing countries that have implemented strict birth control measures, such as China, reproductive choice is influenced by two main factors: the government-mandated birth quota for each couple, and the couple's desired fertility level. The introduction of the Universal Two-Child (UTC) policy in 2015 marked a milestone in China's evolution of its family planning policies. Under the UTC, from January 2016 all couples in China were allowed to have two children. This shift provides a valuable opportunity to differentiate between the importance of the two driving factors and understand their interaction effects.

Using nationally representative large-scale survey data, we investigate how the UTC policy influenced China's fertility among eligible women. Our findings reveal that the UTC policy only led to a modest increase in birth numbers among eligible women by 0.025. Notably, this effect was driven exclusively by women whose stated fertility desire is two or more children. We also explore the medium-term effect of the UTC based on respondents' reported fertility plans, observing a peak followed by a decline as pent-up demand for births waned. Our calculation suggests that even if all Chinese women reproduced according to their revealed fertility desires, the declining birth rate would persist due to the combined effects of a declining number of fertile women and their average fertility desires. The aggregated effect of the UTC policy is equivalent to approximately 4.1% of China's average births during 2016−2017, which only released about 16.6% of China's fertility potential. Additionally, we find that childrearing costs, proxied by housing prices, negatively impacted the effectiveness of the UTC policy. Specifically, a one-standard deviation increase in the log housing prices reduced policy-induced births by 0.007. The dampening effects of housing price were exclusively driven by

women without urban house ownership. These results shed light on how rising childrearing costs reduced the effectiveness of the UTC policy. Overall, our research indicates that the effect of the UTC policy has not been as significant as policymakers had hoped. China's declining maternal fertility desires and the elevated cost of childrearing, rather than policy restrictions, underlie China's rapid decline in birth rates after the abolition of the One-Child Policy (OCP).

This paper closely relates to several strands of literature. First, this paper contributes to a large body of literature on the demographic/fertility transition (Manuelli and Seshadri, 2009; Cervellati and Sunde, 2015; Chatterjee and Vogl, 2018; Delventhal et al., 2021; Yin, 2023). Our study provides the first comprehensive empirical description of a crucial turning point in China's demographic transition. It offers a first-hand perspective on the process of relaxing population control in a country that once implemented strict birth control policies. Moreover, this study speaks to the literature trying to understand the complex interactions of population control policies and socioeconomic changes on fertility outcomes (Vogl, 2016; De Silva and Tenreyro, 2017; Zhang, 2017; De Silva and Tenreyro, 2020; Cavalcanti et al., 2021).

Second, this paper belongs to a small but growing literature on the effects of abolishing family planning policies (Wu, 2022; Agarwal et al., 2024). We are among the first to use administrative data to study the effects of China's UTC policy, which is a landmark change in the evolution of China's family planning policies. An increasing number of people recognize that the impact of imposing and relaxing fertility policy constraints on family reproductive behavior is highly asymmetric (Gu, et. al., 2007; Cai, 2010; Zhang, 2017; Wang and Yang, 2020). Long-term implementation of fertility policies may lead to irreversible and sustained effects on fertility desires and behavior. As birth rates in countries that previously enforced population control policies continue to decline sharply, there is a pressing need for policy shifts from restrictive to encouraging approaches. Our study offers crucial insights for the population policy transformation in such countries.

The remainder of this paper is organized as follows. Section 2 introduces the background of China's family planning policy and its gradual relaxation. Section 3 provides a global perspective on Chinese women's desired fertility. Section 4 analyzes the effects of the UTC policy on birth outcomes and the heterogeneity among women with different fertility desires,

and discusses the implications of our findings. Section 5 explores the role of childrearing costs in shaping China's fertility rate. Section 6 concludes.

2. China's Birth Control Policy and its Gradual Relaxation

In the early 1980s, the Chinese government implemented a stringent birth control policy known as the "One-Child Policy" (OCP). Its primary objective was to curb China's population growth by limiting most families to having only one child.[1] The strict OCP was in place for more than three decades from 1980. In response to the socioeconomic challenges posed by the declining birth rates and the rapid population aging, the Chinese government cautiously shifted its population control policies through several steps. Eventually, it moved away from the strict OCP to more flexible measures, including the recent three-child policy adopted on August 20, 2021. This section provides a brief chronological overview of these policy changes.

Restricted Two-child Policy (RTC, 2011-2015). After almost three decades of strict enforcement of the OCP, China began allowing certain couples to have a second child under specific circumstances. The RTC policy unfolded in two waves. The first wage of RTC were gradually approved by each province and finally covered the whole country in 2011, when the Chinese government allowed couples to have a second child if *both of them* were the only child of their own parents. However, this wave of the RTC, known as the "*Double-Only*" Two-Child policy, relaxed the birth quota constraint for only approximately 3.66% of all women aged 15−49, based on China's 2015 population mini-census. In 2013, the RTC policy underwent further relaxation. On December 28, 2013, China passed the *Resolution on Adjusting and Improving the Population and Family Planning Policy*, allowing provinces to modify local regulations. From January 2014, several provinces announced revisions to their family planning policies, permitting couples to have a second child if *either* of them was the only child of their parents. This wave of the RTC is known as the "*Single-Only*" Two-Child policy. Eligible families were still required to seek approval before giving birth under both waves of the RTC. Approximately 11 million couples becoming eligible to have a second child because of the "*Single-Only*" Two-Child policy, but by September 31, 2015 only about 16.8% of them

[1] In terms of implementation, the policy also included exceptions. For instance, rural families were permitted to have two children if the first child was a girl, and certain minority groups were allowed an additional offspring.

had actually applied for the approval to have a second child, among whom only 1/5 had successfully conceived, according to the data released by China Population Association.[2] Due to the low proportion of eligible couples (about 11.12% of all women aged 15−49 according to China's 2015 population mini-census) and limited take-up rate, this relaxation did not fully overturn the OCP.

Universal Two-Child Policy (2016-2020). In 2015, a significant policy shift occurred when the Chinese central government terminated the *Restricted Two-Child* (RTC) policy. It announced that from January 1, 2016, *all couples* would be allowed to have two children without prior approval. This new policy, known as the *Universal Two-Child* (UTC) policy, is the focus of our study. As the policy targeted all women, it significantly increased the proportion of eligible couples in the population. Initially, there was a transient surge in the number of live births after the policy took effect. However, this increase was not sustained, and the overall total number of live births continued to decline. As depicted in Figure 1, while the UTC policy temporarily boosted the birth rate in 2016, it did not reverse the overall declining trend.

Universal Three-Child Policy (2021-). In 2021, the final abolishment of family planning policies occurred with the implementation of the *Universal Three-Child* policy. Starting on August 20, 2021, all couples were allowed to have three children. As we will see below, the desired fertility of the vast majority of Chinese families do not exceed three children, thus the *Universal Three-Child* policy effectively abolished birth restrictions.

[Figure 1 about Here]

3. Chinese Women's Desired Fertility

Unlike directly observable reproductive behavior, desired fertility is subjective and it reflects women's preferences for childbearing. The literature has gradually reached a consensus: women's desired fertility significantly influences their actual reproductive choices (Schoen et al., 1999; Bongaarts, 2001; Quesnel-Vallée and Morgan, 2003). However, existing literature has not provided a comprehensive picture of the fertility desires of fecund women in China due

[2] Source: http://news.cnr.cn/native/gd/20151128/t20151128_520626818.shtml (in Chinese).

to data availability constraints.

In this section, we present the broad patterns of desired fertility among Chinese women of childbearing age. Our data comes from the 2017 *China Fertility Survey (CFS)*, conducted by the National Health and Family Planning Commission of China. The survey was conducted on July 1, 2017, and the sample includes 249,946 women aged 15 to 60 from 2,737 counties in 31 provinces. The survey employs a three-stage stratified sampling method, ensuring proportional representation based on county population size.[3] CFS collects detailed information about women's personal information, including birth date, ethnicity, marital status, education level, *Hukou* (urban/rural residency) status, number of siblings, health status, employment status, occupation, income (for 2016); it also collects detailed information about women's fertility behavior including number of living children, pregnancy history (if any), contraceptive use; in addition, the survey asks women about their childrearing arrangement (if any), as well as women's fertility intentions, including desired fertility and plans to have (more children) for 2018, 2019, 2020, and after 2020. The survey also asks information about the spouse/cohabitant, though it does not ask for their fertility desires.

The survey posed a crucial question to each fertile woman aged 15–49: "*How many children do you want to have?*" We use their responses to measure *desired fertility*. Figure 2 depicts the distribution of this variable. About 1.42% of the surveyed women expressed no desire to have any children; around 32.16% desire to have only one child; approximately 54.86% expressed a desire for two children; 9.07% desired to have three children, and only 2.49% intended to have four or more. Notice that the response of "three" or more exceeded the prevailing legal birth constraint in 2017 for most women, providing anecdotal evidence that women felt free to reveal their fertility preferences without concern for policy restrictions or penalties.[4] This substantial proportion of women with low fertility desire reflects the profound impact of birth control measures and societal changes in China. Regarding the gap between desired fertility and actual fertility, about 64.51% of women had achieved their desired fertility (i.e., her desired fertility equals to her actual fertility). Additionally, 20.55% of women desired

[3] However, a few counties with small populations were not included in the sample since the sampling design requires at least 40 women per county.

[4] The survey also explicitly encouraged respondents to disclose their *true* desired fertility and other related information.

to have one more child, and 13.7% desired to have two more children, than their actual fertility.

[Figure 2 about Here]

We begin by examining whether the strong correlation between desired fertility and actual fertility holds in China. Panel A of Figure 3 illustrates the correlation between desired fertility and actual fertility for women aged 20–40. The 45-degree line represents an ideal scenario where actual fertility equals desired fertility. The fact that the fitted line, with a coefficient of 0.84, lies below the 45-degree line suggests that, on average, actual fertility is less than desired fertility. This is to be expected because the younger women have not yet completed their childbearing, thus their actual fertility is likely to catch up with their desired fertility.

[Figure 3 about Here]

In Panel B of Figure 3, we document the age profile of the women's fertility desires and unsatisfied fertility desires. Generally, Chinese women's average desired fertility ranges between 1.6 and 1.85 across all age groups. Not surprisingly, for women below 20 years old their desired fertility was almost entirely unmet, while for women above 40 years old, who are past their prime childbearing age, it was nearly satisfied. Therefore, our analyses in Section 4 on the effects of the UTC policy mainly focus on women aged 20–40.

Panel C of Figure 3 reveals a robust positive correlation between the average desired fertility of women aged 15–44 and actual fertility (measured by the proportion of total births from 2016 to 2019 among women of childbearing age) at the county level. This finding suggests that regional-level average desired fertility serves as a strong predictor of actual fertility rates following the implementation of the UTC policy. These findings support our argument that desired fertility will likely serve as a constrain of women's actual fertility.

We now turn to identify key determinants of Chinese women's fertility desires using Poisson regressions. For county-level economic indicators, we obtained county-level per capita GDP data for 2015—the closest pre-policy year—from the *China Statistical Yearbook (County-Level)* and *China City Statistical Yearbook*, published by China's Bureau of Statistics. Additionally, we collected the average listing price of second-hand houses at the county level in 2015 from XiTai Data.[5] We also include a comprehensive set of individual attributes in our

[5] Data source: https://www.creprice.cn. The reason we use the listing prices for the second-hand houses rather than the new houses is that, in China especially in big cities, new homes are often located in remote areas and

analyses.

[Table 1 about Here]

The results, presented in Table 1, focus on different subsamples, using Poisson regressions.[6] Column 1 examines the full sample, while Columns 2–4 consider women with varying numbers of living children. In all regressions we include fixed effects on province, age, ethnicity, and categories of education levels. We find that women residing in wealthier counties and registered as urban citizens in China's *Hukou* system expressed a preference for lower desired fertility (Column 1). These patterns were more pronounced for women with no children yet or with only one living child (Columns 2 and 3). Notably, housing prices (which we interpret as a proxy for childrearing costs in our subsequent analysis in Section 5) exhibit a consistent negative association with desired fertility across all columns except Column 4 (for the subsample of women with two or more living children). This suggests that women in counties with higher housing prices tend to have lower fertility desires. Interestingly, we find that the number of siblings of the woman has a strong and statistically significant effect on women's fertility desire: *ceteris paribus,* one additional sibling increases the women's fertility desire by 0.0425. This suggests fertility restrictions on China's three-decade long one-child policy will negatively affect the fertility desires of Chinese women, even after the OCP is removed.

4. Desired Fertility and the Effects of China's Universal Two-Child Policy

This section analyzes the effect of China's UTC policy on birth outcomes with a focus on understanding the role of women's desired fertility in mediating this effect.

As we mentioned above, the 2017 *China Fertility Survey* collected extensive information on individual and family attributes, notably including each woman's pregnancy history and desired fertility (which we have detailed in Section 3). Consequently, we can construct an individual-by-year level panel dataset from 2012 to 2017. Following Beach and Hanlon (2023),

are subject to various price control measures, thus their prices do not reflect the true condition of the housing market.

[6] We also report results using the OLS strategy in Appendix Table A1. The patterns are quite similar to those documented using Poisson regressions.

we use the woman's *number of live births in year t* as the primary outcome variable.[7]

Our baseline sample focuses on fertile women aged 20–40. We restrict sample to women above 20 years old – China's legal marriage age, because teenager births are not common in China, and the probability of women over 40 having children substantially decreases.[8] Additionally, we exclude samples of women who had not married until 2015 and only considered who had never divorced, as unmarried births were also extremely rare during that period in China and reconstituted families were not subject to the usual fertility quota. Samples from Tibet were excluded due to their special socio-economic conditions.

In order for a woman to be eligible to have a second child under the "*Single-Only*" Two-Child policy in 2015, she must have only one living child, and either she or her husband must have no siblings; in contrast, any woman with one living child is eligible to have a second child under the UTC policy, with no restrictions on whether she or her husband has siblings. As we outline in Table 2, we will characterize the treatment and the control groups based on respondents' situations in December 2015—just before the UTC policy took effect. We categorized all women into five groups based on their UTC policy status. The first group are those women who became eligible to have a second child under the UTC policy but were not otherwise eligible under the "*Single-Only*" Two-Child in December 2015. Specifically, a woman in this group had one living child as of December 2015, and both she and her husband have siblings. This group comprises about 19.5% of women aged 20–40 in our sample and constitutes our treatment group. The second group are those women who had one living child but were eligible to have a second child in December 2015 under the "*Single-Only*" Two-Child policy. Specifically, a woman in this group had one living child as of December 2015, and either she or her husband has no siblings. This group comprises approximately 21.01% of women aged 20–40 in our sample, and constitutes our control group. It is noteworthy that some households, referred to as "exceptional cases" in Table 2, were permitted to have a second child even before the RTC policy. These households mostly include ethnic minority groups, or rural

[7] Although the survey was conducted in July 2017, it specifically asked pregnant women for their expected date of confinement. As a result, we have information about births throughout the entire year 2017, considering the low stillbirth rate in China (6.8‰ in 2017).

[8] Nevertheless, we will use the full sample to conduct robustness checks.

citizens whose first child was a daughter.[9] Consequently, their birth quotas were not affected by the UTC policy. Of course, women with no living child as of December 2015 were already allowed to have an additional child; and women having two or more children as of December 2015 were still not permitted to have an additional child. These three groups of women, referred to as "Other Groups", were thus legally unaffected by the UTC policy. We therefore do not include them in our analysis to ensure a clean treatment-control comparison since they were largely not comparable to women in the treatment or control groups.

[Table 2 About Here]

Table 3 presents the descriptive statistics of some key individual characteristics used in this study for treatment group and control groups, respectively.[10] Notice that the women in the treatment and the control groups, by design, both have one living child as of December 2015. The most crucial difference is whether the number of siblings: for the treatment group, the woman must have at least one sibling for her not to be eligible to have a second child under the "*Single-Only*" Two-Child policy prevailing in December 2015, while for the control group, either the woman herself or her husband needs to have no siblings. Indeed, the average number of siblings for the women in the treatment group is 1.633, while that for the control group is 0.58. The treatment and control groups are not entirely comparable in terms of observable individual characteristics, including age, education levels, and *Hukou* status. Therefore, we should account for these unbalances in our future analyses.

[Table 3 About Here]

4.1. Effects of China's Universal Two-Child Policy

We use a standard difference-in-differences (DID) strategy to identify the effects of the UTC policy on fertility outcomes:

$$y_{i,t} = \beta Eligible_i \times Post_t + \mu_i + \gamma_{p,t} + \mathbf{X_{i,t}}'\mathbf{\Gamma} + \varepsilon_{i,t} \quad (1)$$

where $y_{i,t}$ denotes the total number of births of woman i in year t; $Eligible_i$ equals 1 if the respondent was eligible to have a second child under the UTC policy but not eligible under the

[9] Appendix B provides a detailed list of the special provisions on birth quotas issued by each provincial government that were considered in our analysis.

[10] Appendix Figure A1 shows the histogram of some key individual characteristics, including their desired fertility, age and years of schooling, for the treatment and the control groups, respectively.

"*Single-Only*" Two-Child policy, as measured in December 2015; $Post_t$ takes the value of 1 in 2016 and 2017; $\mathbf{X_{i,t}}$ is a vector of control variables, including fixed effects on age, ethnicity, categories of education levels, and a dummy variable denoting urban *Hukou* status, all of which are interacted with a full set of year dummies. μ_i is individual fixed effect, and $\gamma_{p,t}$ is province-by-year fixed effects. Notice that since we measure $Eligible_i$ at the end of 2015, even though the analysis period covers the years from 2012. Because in our sample selection, we require that both the control and treatment groups have exactly one living child as of December 2015, their cumulative realized fertility prior to 2016 are held to be the same by design.

In order to explore the role of women's fertility desire in mediating the effect of UTC on child birth outcomes after the implementation of the UTC, we also modify Equation (1) to implement a difference-in-differences-in-differences (DDD) strategy, as described in Equation (2), where $\mathbf{I_i^{High\ desire}}$ is a dummy variable that takes value 1 if woman *i* had a fertility desire of two or more children:[11]

$$y_{i,t} = \beta_1 Eligible_i \times Post_t + \beta_2 Eligible_i \times Post_t \times \mathbf{I_i^{High\ desire}} + \mu_i + \gamma_{p,t} + \mathbf{X_{i,t}}'\mathbf{\Gamma} + \varepsilon_{i,t}, \quad (2)$$

where all the other variables are the same as those in Equation (1). β_1 measures the changes in the birth outcomes of women with low fertility desire (0 or 1 child), in response to the UTC policy, whereas $\beta_1+\beta_2$ measures the changes in the birth outcomes of the women with high fertility desire (2 or more children). Standard errors are clustered at the county level, allowing for potential correlation of the error terms within counties and over time.

Table 4 presents the regression results. In Column 1, we do not control for individual fixed effects and include $Eligible_i$ instead. In Column 2, we add individual fixed effects and find strong evidence that the UTC policy led to a mild increase in the number of births among eligible women in the two post-UTC years, approximately by 0.025. This indicates that the UTC policy effectively raised birth rates among eligible women during the two years following its implementation. A rough back-of-the-envelope calculation suggests that the UTC policy unleashed about 744 thousand additional births per year in the first two years after its implementation (2016 and 2017) relative to the "*Single-Only*" Two-Child policy, accounting

[11] Notably, our data is cross-sectional, assuming relative stability in women's desired fertility across years. In our subsequent analysis, we will explore the validity of this assumption.

for merely about 4.1% of China's average births in 2016−2017.[12] This calculation indicates that the policy effect has not been as significant as policymakers had hoped.

[Table 4 About Here]

Apart from the average effects, women's reactions to the UTC policy show substantial heterogeneity. Because of the biological limits for women to be fertile, one may suspect that the older women may respond to the new eligibility for a second child under the UTC with more urgency than younger women. We thus also explore the heterogeneous effect of the UTC policy by woman's age. Specifically, we add the interaction of three dummies, which denote age groups 20−25, 26−30, and 31−35 respectively, with our main DID regressor in Column 3 of Table 4, where the omitted age group 36−40 serves as the reference group. The result suggests that the UTC policy increased fertility across all the three age groups, with the largest effects observed for women aged 26−30, while the reference group of women aged 36−40 showed a slight decline in fertility at 10% statistical significance level. The older women, while feeling more urgency to respond to the UTC policy so as to have births before menopause, may be limited in their ability to conceive due to the biological clock; they are also likely to face objections from their living children, who tended to be older, for having additional births. The negative effect of the UTC on the older age group, however, may result from perceived competition their offspring may face from the flux of new babies born to younger mothers.

Column 4 of Table 4 presents the regression results using the specification of Equation (3). We observe that high fertility desire women exhibited an additional 0.0256 births in the post-UTC era compared to low fertility desire women, suggesting that the average effect of the UTC policy estimated in Column 2 was predominantly driven by women with fertility desires of two or more children.

The identification assumption underlying Equation (2) requires that the relative fertility outcomes of high- and low-desire women in the treatment group follow a similar trend as those in the control group in the absence of the UTC policy (Olden and Møen, 2022). While this assumption cannot be directly tested, we can provide corroborative evidence by examining a

[12] The survey sample represents approximately 0.536‰ of China's married women of fertile age (273.3 million) in 2015. Thus, we estimate the aggregated number of policy-induced additional births to be 7,435,993 (0.0246*16,202/0.000536).

necessary condition of this assumption—referred to as a parallel pre-trend—and gain deeper insights into the dynamic effect of the UTC policy. Panel A of Figure 4 presents the event study result regarding the average effects of the UTC policy on birth numbers, which demonstrates no deviation from the parallel pre-trend assumption. Then, we replace $Post_t$ in Equation (2) with a full set of year dummies and present the event study results for β_2 in Panel B of Figure 4. The differences in outcomes between women with high and low fertility desire in the treated group evolve similarly to those in the control group before the UTC policy. However, a discrete shift occurs afterward, suggesting that the UTC policy triggered a bifurcation of the trend due to heterogeneous reactions to the policy, varying by women's fertility desires.

[Figure 4 about Here]

In summary, our analysis demonstrates that the UTC policy has a positive but mild effect on the fertility rate of the treated group, and that women's desired fertility plays a vital role in mediating the effect of the UTC on the number of births.

4.2. Threats to Identification and Robustness Checks

One major limitation of our data lies in the cross-sectional nature of the survey, which provides information on women's fertility desires only in 2017. Concerns may arise that fertility preferences could evolve in a way correlated with the implementation of the UTC policy. For instance, if women more likely to react to the UTC policy adjusted their revealed fertility desires from one child to two, the estimated coefficient of β_2 would be upward biased. We believe this concern may not seriously invalidate our strategy for two reasons. First, our preferred specification in Equation (2) controls for a full set of individual attributes interacted with flexible year dummies. This accounts for a considerable part of the omitted variable bias, assuming that the underlying co-movement of changes in revealed fertility desires and real birth outcomes is influenced by these observed common factors. Second, we provide supportive evidence that the UTC policy was unlikely to be correlated with respondents' fertility desires. A small subsample of women, pregnant or planning to give birth in the coming years, responded to a survey about whether the UTC policy affected their fertility desires. Among them, 70% reported no impact on their fertility desires, while only 12% indicated that the UTC altered their desires. In Appendix Table A2, we run an ordered Probit model and find

no systematic correlation between women's revealed fertility desires and their perception of how the policy affected their fertility desires.

Our main findings withstood a battery of additional robustness checks.[13]

Alternative Model Specifications. To assess the sensitivity of our baseline results to controlling for a large set of fixed effects in the main specification, we limit our control variables to basic individual and year fixed effects in Column 1 of Appendix Table A3. Remarkably, the estimated coefficients of $Eligible_i \times Post_t \times \boldsymbol{I}_i^{High\ desire}$ remain largely unchanged compared to our main specification, which includes abundant controls. This robustness suggests that the patterns observed in our preferred specification hold even when using sparser controls. In addition, recent literature finds that father's fertility desire can play a vital role in family childbearing decisions (Doepke & Kindermann, 2019). Regrettably, the 2017 *China Fertility Survey* did not collect information about husband's desired fertility. To consider potential influence of fathers, we further control for the interactions of year dummies with a full set of husband's attributes, including dummies on age, ethnicity, urban *Hukou*, and categories of education levels, in Column 2 of Appendix Table A3. The estimates remain consistent with our baseline results reported in Column 4 of Table 4.

Alternative Sample Choices. Our primary empirical analysis focuses on a sample of women aged 20−40. However, one might raise concerns about the exclusion of women aged above 40. Since older women may be more urgently affected by the UTC policy due to their fertile-age constraints, excluding them could potentially bias our estimates. To address this concern, we relax the age restriction and consider a broader age range of 20 to 49. The results, presented in Column 3 of Appendix Table A3, exhibit highly consistent patterns. In Column 4 of Appendix Table A3, we exclude the sample from ethnic minorities to address concerns regarding the different birth quotas applied to them. The results indicate no deviation from the pattern observed in our main analysis.

Potential Confounding Effects from Short Birth Spacing. A woman newly eligible to have a second child under the UTC policy might not have responded to the UTC policy if her first childbirth occurred in 2014−2015, which can lead to an underestimation of the policy's effects.

[13] Due to space limitations, we only report robustness check results for Column 4 of Table 4. Results for other columns are similar and available upon requests.

To address this concern, we exclude women who gave birth to their first child in 2014−2015 in the treatment group from our estimation sample, and report the estimate in Column 5 of Appendix Table A3. The coefficient estimate of $Eligible_i \times Post_t \times \boldsymbol{I}_i^{High\ desire}$ is 0.0495, which is larger in magnitude than the baseline estimate reported in Table 4. We further eliminate women who gave birth to their first child in 2014−2015 in both the treatment and control groups from our sample and report the estimates in Column 6 of Appendix Table A3. The point estimates of both $Eligible_i \times Post_t$ and $Eligible_i \times Post_t \times \boldsymbol{I}_i^{High\ desire}$ drop slightly but remain statistically significant. These results collectively alleviate our concerns regarding short birth spacing.

Potential Confounding Effects of the "Single-Only" Two-Child Policy. Importantly, the UTC policy was implemented shortly after the "*Single-Only*" Two-Child policy. This introduces potential bias in our estimates through the following scenario. Specifically, a woman who became eligible for the "*Single-Only*" Two-Child policy and prepared to have a second child when the *"Single-Only"* Two-Child was enforced in 2013 could give birth after December 2015. However, her birth would be counted as an effect of the UTC policy, masking the legacy impact of the *"Single-Only"* Two-Child policy. To address this possibility, we provide an alternative estimate by excluding women who had ever given birth to their second child from January to August in 2016 in Column 7 of Appendix Table A3. Remarkably, the corresponding estimates in Column 7 change only slightly. Considering the fact that the UTC policy was firstly announced on October 28, 2015 and legally effective from January 1, 2016 and the normal gestational period was about 40 weeks, this strategy helps to tease out potential confounding effect of the "*Single-Only*" Two-Child policy, bolstering our confidence in the results.

Using Pregnancy as the Outcome Variable. In our baseline analyses, we use the number of live births as the outcome variable. However, one might raise concerns that this outcome could be influenced by abortion decisions—individuals facing economic pressure might choose to abandon pregnancies, potentially leading to an underestimation of the true effects of the UTC policy on fertility attempts. To address this concern, we examine the total number of ended pregnancies (regardless of the pregnancy outcomes) in Column 8 of Appendix Table A3. The estimated treatment effect of UTC is smaller in magnitude than the baseline.

Overall, although the economic magnitude varies across columns of Appendix Table A3, the consistent pattern emerges: the most significant increase in births occurred among women with high birth desires.

4.3. Effects on Fertility Plans

One primary limitation of our data is that the survey was conducted in 2017 and only covered a relatively short post-treatment period (2016 and 2017). If Chinese families did not respond immediately in their fertility decisions to the UTC policy, our analysis might underestimate its effects. Fortunately, the survey also collected information on the respondents' fertility plans in years 2018 and beyond, enabling us to quantify the UTC policy's medium-term impact on fertility outcomes.

Specifically, the survey asked women who were not currently pregnant and had non-zero fertility desires the question: "*When do you plan to have (more) children*?" Respondents could select one from the following choices: 2018, 2019, 2020, 2021 or later, or indicate having no specific plan. We make a strong assumption that all women strictly adhere to their disclosed fertility plans. Consequently, we set $Birth_{i,t}$ (the number of births for woman i in year t) as 1.003 (the average number of births per parity in our data) if a woman stated a plan to give birth in year t. We recognize that this assumption may *overestimate* actual births per woman for two reasons. First, women do not always strictly follow their birth plans, as reproductive activities are constrained by various objective factors; second, even if a successful pregnancy occurs according to the plan, it does not guarantee a live birth. Nevertheless, by extending our panel data using information from respondents' fertility plans, we can estimate an *upper bound* of the real medium-term effect of the UTC policy.

We replicate the event study results using the specifications outlined in Panels A and B of Figure 4, and present the findings in Panels A and B of Figure 5, respectively. To prevent any misunderstanding, we have clearly marked the range of data coverage obtained from women's fertility plans (starting from 2018). In Panel A, the policy effect on birth numbers exhibits a continuous decline from 2017 to 2021 or later. However, it's important to consider that our extended data, constructed from fertility plans, may significantly inflate actual fertility outcomes, leading to an upward-biased point estimate for the coefficients in 2018 and

subsequent years. Consequently, the actual policy effect during these years should be substantially smaller than those reflected by the point estimates in Panel A of Figure 5. Consistent with our main results shown in Panel B of Figure 4, the policy effect on planned fertility primarily occurs within the high-desire group (Panel B of Figure 5).

[Figure 5 about Here]

The overall patterns suggest that the UTC policy appears to have rapidly tapped into the latent potential of individuals willing to have children, followed by a swift decay in its effect.

4.4. Discussion on the Implications of Our Findings

Our previous analysis revealed the critical role of women's fertility desires in shaping the UTC policy effects. In this subsection, we conduct an upper-bound estimate of the potential increase in births released by China's switch to the UTC policy, as revealed by Chinese women's desired fertility in 2017.

We assume that every woman procreated according to her stated fertility desire and calculate average unfulfilled fertility desires for each prefecture-cohort cell as revealed in the 2017 *China Fertility Survey*. Next, we construct the total number of women for each cohort of each prefecture using China's 2015 mini-census and aggregate fertility potentials for all women aged 15−49. Our calculation yields an upper-bound estimate of fertility potentials in 2015: 4,473,000 additional births per year.[14] Compared with the actual birth number in 2015—18,720,000—fully tapping the fertility potentials should only increase the birth numbers by about 23.9%. However, this calculation is based on cross-sectional data, and thus it may vastly overestimate childbearing potentials in China. Recall that our back-of-the-envelope calculation in Section 4.1 suggests approximately 744,000 additional births per year in 2016-2017 as a result of the UTC policy. The UTC policy only released about 16.6% of China's fertility potential as revealed in the 2017 *China Fertility Survey*.

We emphasize that two critical constraints hinder the release of this potential: the fast-declining number of fertile women and their average fertility desires. Panel A of Figure 6 depicts the evolving trend of the annual number of fertile women from 2012 to 2035, calculated from China's 2015 population mini-census. China's declining number of women in the fertile

[14] This calculation naively assume that these births uniformly occurred within these women's fertile-age.

age group results from a combination of demographic shifts, societal changes, and government policies. The country has undergone a demographic transition characterized by declining birth rates and increasing life expectancy, leading to a shift in the population pyramid with fewer young women entering the reproductive age group. Panel B of Figure 6 illustrates the average desired fertility of women aged 20−40 in China over the same period, calculated from our survey data. As women of childbearing age who have exited the reproductive years are continuously replaced by younger women with lower desired fertility, the average desired fertility of women of childbearing age experienced a brief plateau between 2012 and 2016, followed by a rapid decline from 1.78 in 2016 to 1.63 in 2035.

[Figure 6 about Here]

These stylized facts imply that the sharp fall in birth rates should be attributed to a combination of declining number of fertile women and their fertility desires in China. More importantly, even if all desired fertility has been realized, it is difficult to reverse the decline in birth rates.

5. The Role of Childrearing Cost

In addition to women's fertility desires and the UTC policy, the high cost of raising children is also considered a significant factor contributing to the declining fertility rate. According to the 2017 *China Fertility Survey*, approximately 58.8% of women referred to 'the childrearing cost is too high' as "the primary reason for not planning to have (more) children". Other significant reasons mentioned include being "too old" (22.6%), having "no one to take care of the child" (5.4%), the belief that "raising children is too taxing" (3.1%), and "health reasons of the couple" (2.9%).[15] In this section, we explore whether elevated childrearing cost undermines the effects of the UTC policy.

5.1 Using Housing Price as a Proxy for Childrearing Cost

While our survey data provides information on childrearing costs from various perspectives, we face two challenges when directly formulating an empirical test. First,

[15] Each respondent could select up to three of these options as her primary reason for not planning to have (more) children, listed in the order of the importance. See Figure A2 in the Appendix for a tabulation of the frequency of all the listed reasons.

childrearing costs are only observable for women who have already reared children. Second, childrearing costs may be highly endogenous, influenced by various family and individual attributes. For instance, wealthier families might opt for more expensive parenting approaches. To overcome these obstacles, we use housing prices as another proxy for childrearing costs in China.

China's real estate market has experienced a dramatic and enduring boom since the 1990s (Liu and Xiong, 2020). The escalating housing prices, particularly in urban areas, have long been implicated as a trigger for China's rapid decline in fertility rates. According to data provided by China's National Bureau of Statistics, residential costs accounted for approximately 24.6% of China's per capita expenditure in 2020.[16] This proportion is even higher for families residing in the metropolitan areas. Consequently, the swift rise in housing prices tends to dampen residents' willingness to have children by increasing childrearing costs (Meng et al., 2023; Liu and Zhang, 2024). However, the real estate boom in China may also yield positive effects on fertility due to the well-recognized wealth effect (Tan et al., 2023).[17] Therefore, the role of housing prices in mediating the impact of the UTC policy on fertility remains uncertain and awaits comprehensive empirical investigation.

Using rich information in our survey data, we present formal empirical evidence that housing prices in China serve as a reliable proxy for childrearing costs in Appendix Table A4. We control for a comprehensive set of county and individual attributes to mitigate the confounding effects of other socioeconomic factors. Columns 1 to 3 reveal robust correlations between housing prices and childrearing costs, including medical expenses and kindergarten/nursery costs. These findings support our use of housing prices as a valid proxy for childrearing costs in subsequent analyses.

5.2 Interactions between Housing Price and the Universal Two-Child Policy

To shed light on how housing price affects the effects of the UTC policy on fertility, we exploited another DDD strategy as in Equation (3):

[16] Data source: China's Bureau of Statistics, *Households' Income and Consumption Expenditure in 2020.* Website: https://www.stats.gov.cn/english/PressRelease/202101/t20210119_1812523.html. Residential costs include expenditures on rent, water, electricity, fuel, and property management, as well as the imputed rent for owned housing.

[17] Liu et al. (2023) documents evidence that underdeveloped credit markets in China may suppress the positive wealth effect of house value growth on childbearing.

$$y_{c,i,t} = \beta_1 Eligible_i \times Post_t + \beta_2 Eligible_i \times Post_t \times Log(price)_c + \mu_i + \gamma_{p,t} + \mathbf{X_{i,t}}'\mathbf{\Lambda} + \varepsilon_{c,i,t}, \quad (3)$$

where $Log(price)_c$ denotes the logarithm of county-level average listed price of second-hand house in 2015, which measures economic burden of raising a child. $\mathbf{X_{i,t}}$ includes the same set of control variables and other variables are defined similarly as in Equation (2).

Table 5 reports the regression results. Notably, the impact of the UTC policy was considerably smaller in counties with higher housing prices: A one-standard deviation increase in the log housing prices (0.694) reduced policy-induced births by 0.007 (Column 1). Additionally, we present the event study results separately for β_2 and β_1 in Appendix Figure A3. Both subfigures reveal no observable violations of the parallel trend assumption, providing visual evidence that pre-existing trends may not be driving the results.

As discussed in Section 3, higher housing prices may also contribute to lower desired fertility. To address this, we control for desire-by-year fixed effects in Column 2 of Table 5, ensuring that we compare fertility outcomes among women with identical desired fertility. This approach allows us to isolate the channel through which housing prices impact fertility. The point estimate of β_2 drops significantly and becomes statistically insignificant, suggesting that the housing price might majorly affect fertility outcomes through reducing maternal fertility desires.

In Columns 3 and 4 of Table 5, we repeat the regression in Column 2 using subsample of non-homeowners and homeowners, respectively. The patterns revealed in the full sample were maintained in Column 3, suggesting that the dampening effect of housing prices was only pronounced for women without urban homes. For homeowners, Column 4 reveals that the housing prices have a positive, though not statistically significant, effect on of the number of births induced by the UTC policy. This heterogeneity aligns with the observation that rapid increases in housing prices lead to a pronounced crowding-out effect for families lacking their own residences. These families may delay or reconsider having children due to financial constraints, and they are less susceptible to the wealth effect associated with rising housing prices.

[Table 5 About Here]

Overall, this section provides insights into how high childrearing costs can undermine the

effects of the UTC policy on fertility.

6. Concluding Remarks

This paper evaluates the impact of China's UTC policy on fertility outcomes using nationally representative administrative survey data. Our findings reveal that the UTC policy led to a mild increase in the number of births among eligible women by 0.025 in the two years (years 2016 and 2017) immediately after the adoption of the UTC policy. Notably, this effect was driven exclusively by women with fertility desires of two or more children, suggesting that maternal fertility desires, rather than policy restrictions, underlie China's rapid decline in birth rates after the abolition of the OCP. We also quantify the medium-term policy effect based on respondents' reported fertility plans for years 2018 and beyond. The results indicate that the policy effect reached its peak in the first two years and then declined rapidly as the pent-up demand for births was satisfied. Additionally, we find that housing prices, as a proxy for childrearing costs, negatively affected women's fertility desires: a one-standard deviation increase in the log housing prices (0.694) reduced policy-induced births by 0.007 on average. The dampening effect of housing prices is predominantly driven by women without urban housing ownership. The aggregated effect of the UTC policy is equivalent to about 4.1% of China's average births in 2016−2017, which only released about 16.6% of China's fertility potential.

The findings of this paper have yield rich policy implications. As the average desired fertility of Chinese women has fallen below two and continues to decrease, the desired number of births rather than birth quotas is the binding restriction for Chinese families when making fertility decisions. Therefore, the recent three-child policy (from August 20, 2021) may not significantly reverse the declining trend. Although focused on China's Universal Two-child policy, our findings can be generalized to other countries. Policymakers should implement favorable pro-natal policies that can increase the desired fertility rather than merely alleviating fertility policy constraints to brake the steep declining fertility rates around the world.

Data Availability Statement: Due to the *Statistics Law of the People's Republic of China*, the data used in this paper is confidential and cannot be made available online. If you wish to replicate our results, you can submit an application to China Population and Development Research Center (https://data.cpdrc.org.cn.) to access the data, subject to approval by the relevant authorities.

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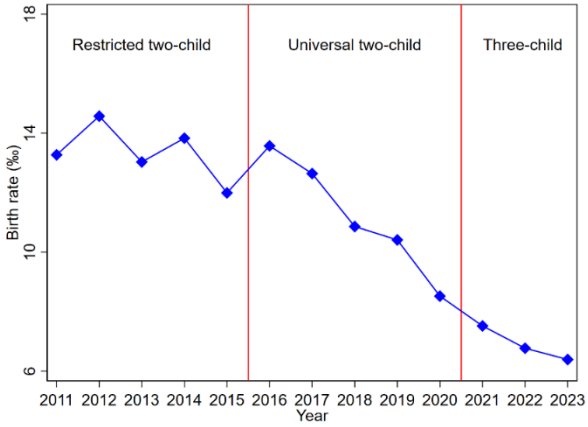


Figure 1: Evolving Trend of China's Birth Rate, 2011-2023

Notes: birth rate = total births/average annual population*1000.

Data source: China's Bureau of Statistics.

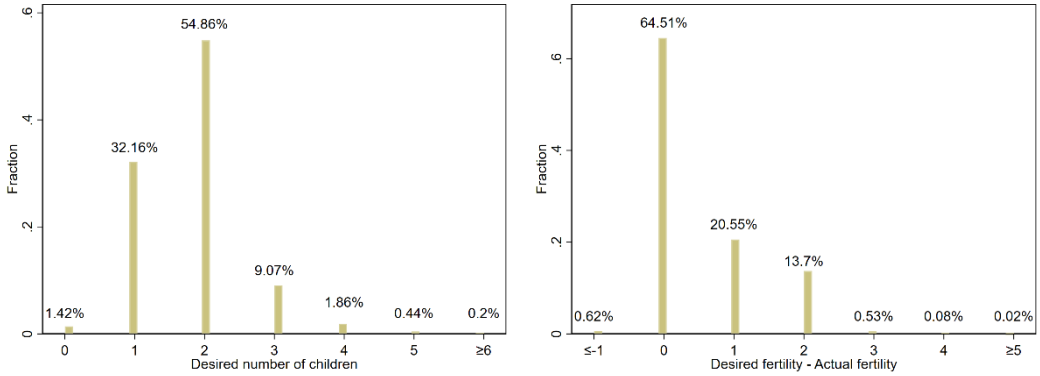
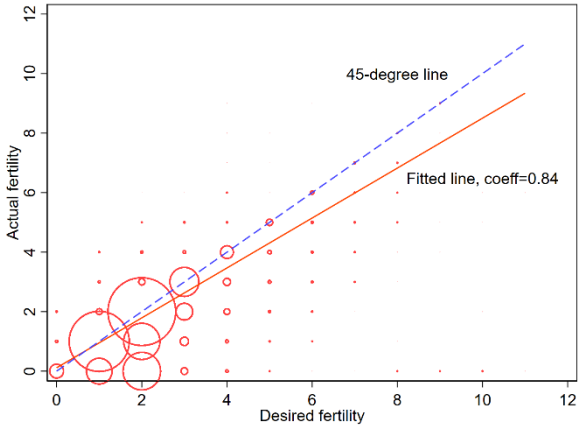


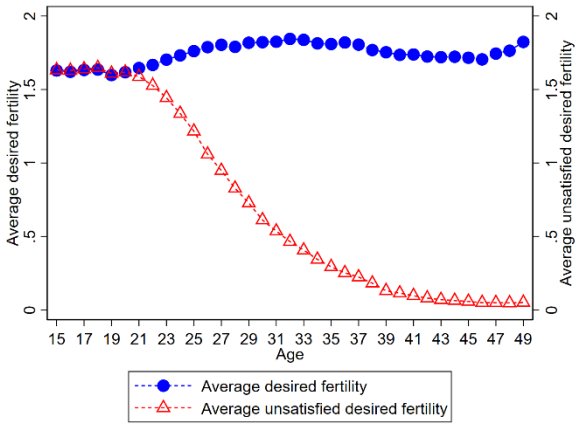
Figure 2: Distribution of Women's Fertility Desires

Notes: Desired fertility is a woman's reported desired number of children. Actual fertility denotes her living number of children in December 2015. *Data source*: 2017 China Fertility Survey.

Panel A: Correlation between individual-level desired fertility and actual fertility



Panel B: Average desired fertility and unsatisfied desire by age



Panel C: County-level correlation between desired fertility and birth rates in post-UTC era

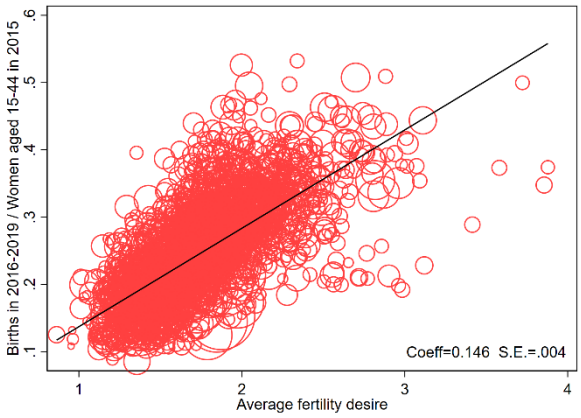
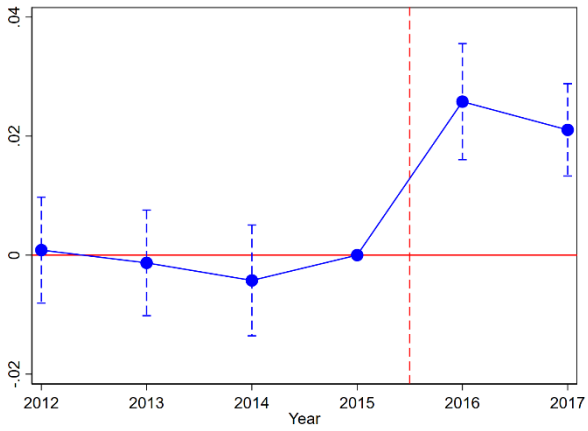


Figure 3: Correlation between fertility desire and fertility.

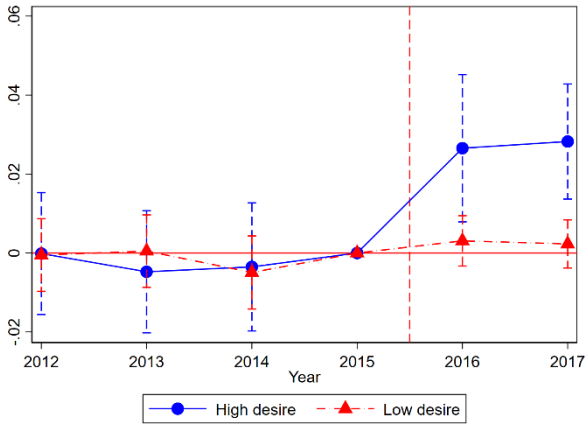
Notes: In Panel C, each dot is weighed by a county's number of fertile women (aged 15-44) in 2015.

Data source: China's 2020 population census and 2017 China Fertility Survey.

Panel A: Average Effects



Panel B: Separate Effects on Women with High and Low Fertility Desires



Panel C: Relative Effect on Women with High Fertility Desires

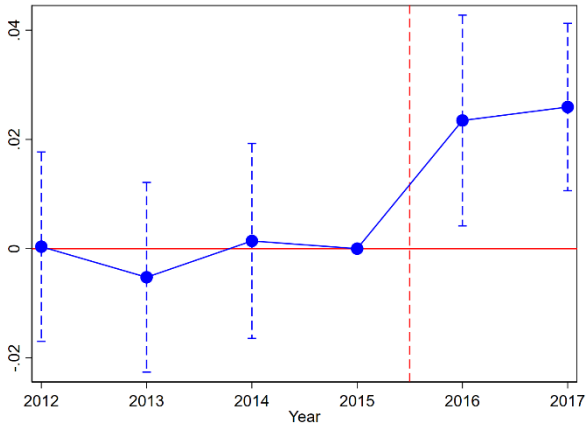
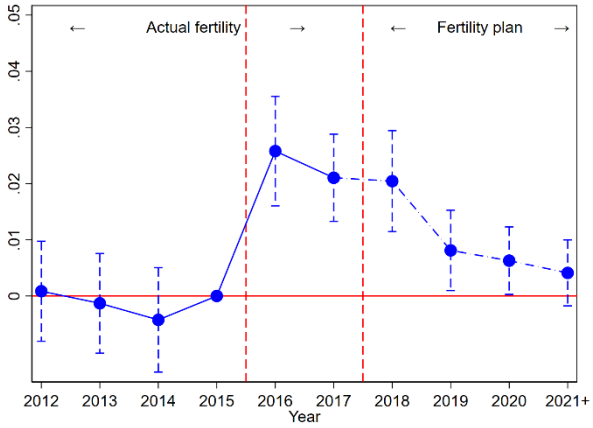


Figure 4: Event Study Results on the Effects of Universal Two-Child Policy on Fertility

Notes: Panel A illustrates event study graph for the average effects of the UTC policy on birth numbers of treated group women. Panel B depicts the effect of the UTC policy for high and low desire women separately. Panel C depicts event study graphs for the relative effects of the UTC policy on women with high fertility desire to those with low desire in treated group compared to untreated group.

Panel A: Average Effects of the Universal Two-Child Policy



Panel B: Separate Effects on Birth Numbers by Fertility Desire

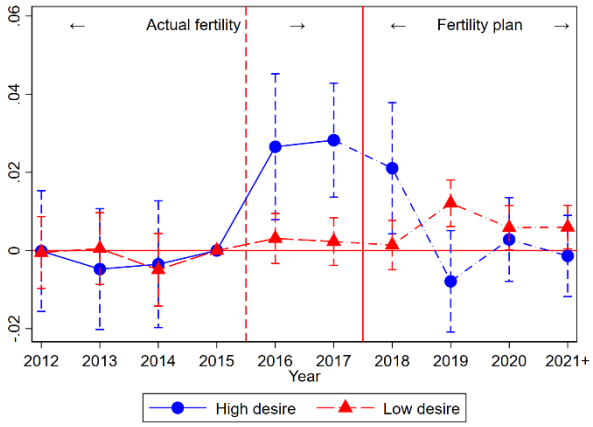
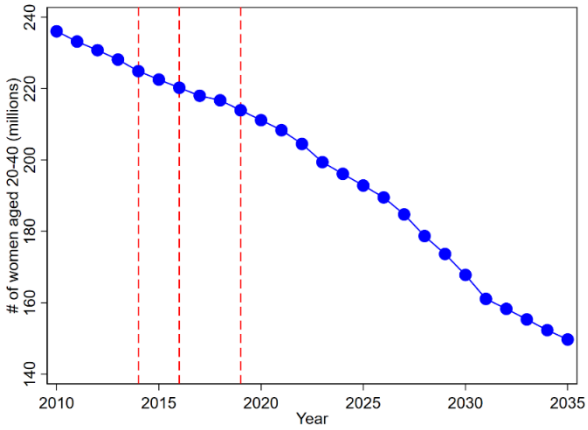


Figure 5: Event Study Graph for the Effects of Universal Two-Child Policy on Fertility Plans

Notes: The number of births after 2017 are constructed according to respondents' self-reported birth plans. "2021+" denotes the year 2021 or later. Panel A depicts event study graph for the average effects of the UTC policy on treated group women. Panel B depicts the effects of the UTC policy for high and low desire women separately.

Panel A: Number of Fertile Women



Panel B: Average Fertility Desires of Fertile Women

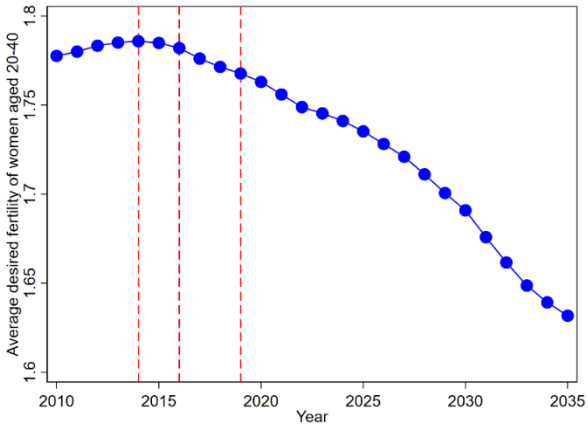


Figure 6: Evolving of China's Number of Fertile Women and their Average Fertility Desires

Data sources: Panel A is calculated from China's population mini-census in 2015. Panel B comes from 2017 *China Fertility Survey*.

Table 1: Determinants of Chinese Women's Fertility Desires (Poisson Regression)

	(1)	(2)	(3)	(4)
Dep. Var.	Desired number of children			
Sample	Full Sample	With no living children	With one living child	With two or more living children
Housing price (log)	-0.0347***	-0.0379***	-0.0324***	-0.00497
	(0.0107)	(0.0134)	(0.00939)	(0.0150)
Per capita GDP (log)	-0.123***	-0.0616***	-0.0676***	-0.105***
	(0.00866)	(0.0109)	(0.00722)	(0.0112)
Family income (log)	-0.0149***	0.0211***	0.00991**	-0.0312***
	(0.00352)	(0.00724)	(0.00430)	(0.00478)
Urban *Hukou*	-0.175***	-0.0539***	-0.0714***	-0.0519***
	(0.00749)	(0.0133)	(0.00733)	(0.00970)
# of siblings	0.0425***	0.0380***	0.0224***	0.0316***
	(0.00235)	(0.00669)	(0.00301)	(0.00298)
Observations	89,678	14,925	35,956	38,787
Dep. Mean	1.828	1.593	1.451	2.268
Controls	Yes	Yes	Yes	Yes

Notes: This table reports the average marginal effects for each explanatory variable at the mean of the dependent variable in the Poisson regressions. Controls include fixed effects on province, age, ethnicity, and categories of education levels. Standard errors are calculated using the delta-method. *, **, and *** denote significance at 10%, 5%, and 1% respectively.

Table 2: Definition of Treatment and Control Groups of the Universal Two-Child Policy

	Treatment Group	Control Group	Other Groups		
# of living children	1	1	1	2+	0
Type	Eligible for the UTC policy, but ineligible for the "*Single-Only*" Two-Child policy	Eligible for the "*Single-Only*" Two-Child policy	Exceptional cases	With two or more living children	Without living children
Proportion	19.50%	21.01%	9.4%	43.46%	6.63%

Notes: All respondents in our analytic sample are categorized into five groups based on their situation in December, 2015. Women eligible for the "*Single-Only*" Two-Child policy in 2015 should have only one living child and married with a man, either of which has no siblings. Women eligible for the UTC policy should have one living child.

Table 3: Descriptive Statistics of Individual Characteristics

	Treatment group		Control group		
	Obs.= 16,202		Obs.= 17,460		
Variables	Mean	Std. Dev.	Mean	Std. Dev.	Differences
Desired fertility	1.462	0.547	1.424	0.527	0.0379***
Age	34.65	5.449	32.95	4.886	1.698***
Years of schooling	10.85	3.363	12.52	3.254	-1.667***
Urban *Hukou*	0.387	0.487	0.552	0.497	-0.165***
# of siblings	1.633	0.991	0.580	0.824	1.054***

Table 4: Effects of Universal Two-Child Policy on Fertility

	(1)	(2)	(3)	(4)
Dep. Var.	Number of Births			
$Eligible_i \times Post_t$	0.0246***	0.0246***	-0.00546*	0.00393**
	(0.00253)	(0.00253)	(0.00283)	(0.00156)
$Eligible_i$	-0.00714***			
	(0.00105)			
$Eligible_i \times Post_t \times \boldsymbol{I}^{20\leq Age\leq 25}$			0.0363***	
			(0.00802)	
$Eligible_i \times Post_t \times \boldsymbol{I}^{26\leq Age\leq 30}$			0.0571***	
			(0.00601)	
$Eligible_i \times Post_t \times \boldsymbol{I}^{31\leq Age\leq 35}$			0.0298***	
			(0.00519)	
$Eligible_i \times Post_t \times \boldsymbol{I}^{High\ desire}$				0.0256***
				(0.00482)
Observations	201,948	201,948	201,948	201,948
Dep. Mean	0.0801	0.0801	0.0801	0.0801
Num. of Clusters	2,529	2,529	2,529	2,529
Individual FE	No	Yes	Yes	Yes
Province-by-Year FE	Yes	Yes	Yes	Yes
Controls × Year FE	Yes	Yes	Yes	Yes

Notes: $\boldsymbol{I}^{High\ desire}$ is a dummy variable that takes value 1 if the woman's desired fertility is two or more children. Controls include fixed effects on age, ethnicity, categories of education levels, and urban *Hukou*. Standard errors are clustered at the county level. *, **, and *** denote significance at 10%, 5%, and 1% respectively.

Table 5: The Role of Childbearing Cost

	(1)	(2)	(3)	(4)
Dep. Var.	Number of Births			
Sample	Full sample	Full sample	Non-home owners	Home owners
$Eligible_i \times Post_t$	0.0239***	0.0145***	0.0111***	0.0142***
	(0.00256)	(0.00233)	(0.00345)	(0.00301)
$Eligible_i \times Post_t \times$ *Housing price*$_c$ *(log)*	-0.0103***	-0.00500	-0.0135***	0.00404
	(0.00353)	(0.00309)	(0.00427)	(0.00432)
Dep. Mean	0.0802	0.0802	0.0899	0.0693
Observations	199,782	199,782	105,750	93,990
Num. of Clusters	2,494	2,494	2,321	1,627
Individual FE	Yes	Yes	Yes	Yes
Province-by-Year FE	Yes	Yes	Yes	Yes
Controls × Year FE	Yes	Yes	Yes	Yes
Desire-by-Year FE	No	Yes	Yes	Yes

Notes: The log of housing price has been demeaned. Home owner is defined as families who owned an urban house. Controls include fixed effects on individual, age, categories of education levels, ethnicity, and having an urban *Hukou*. Columns 2–4 additionally control for desire-by-year fixed effects, allowing for a focused comparison between women with identical desired fertility. Standard errors are clustered at the county level. *, **, and *** denote significance at 10%, 5%, and 1% respectively.

Online Appendix A: Additional Figures and Tables

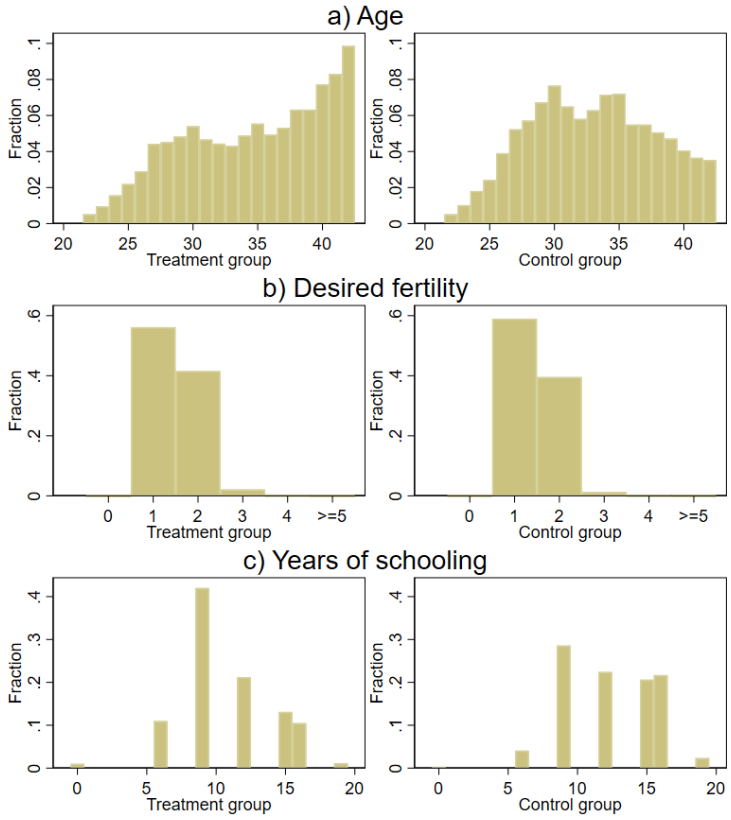


Figure A1: Key Individual Attributes in the Treatment and Control Groups

Notes: This figure illustrates the histogram of some key individual attributes in the treatment group and control group, respectively.

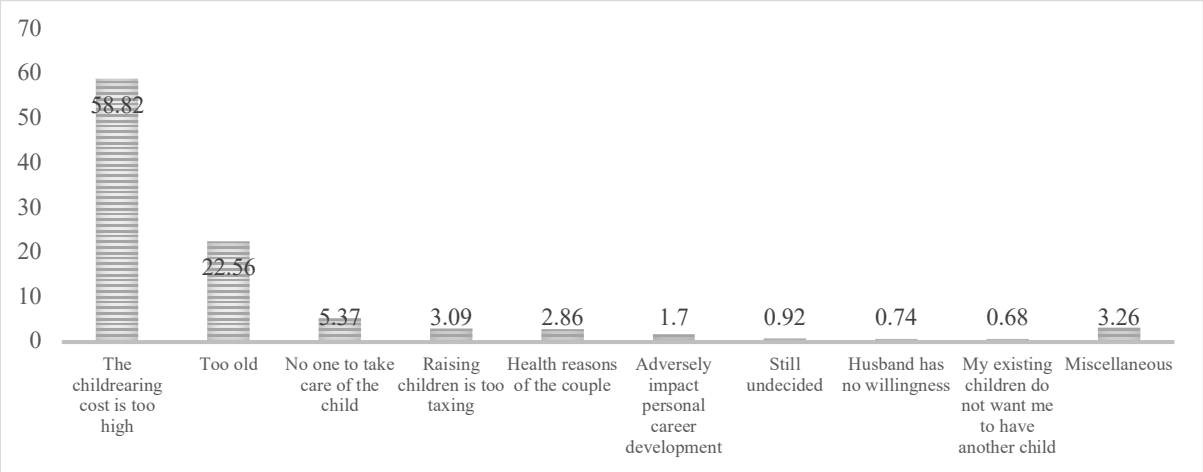
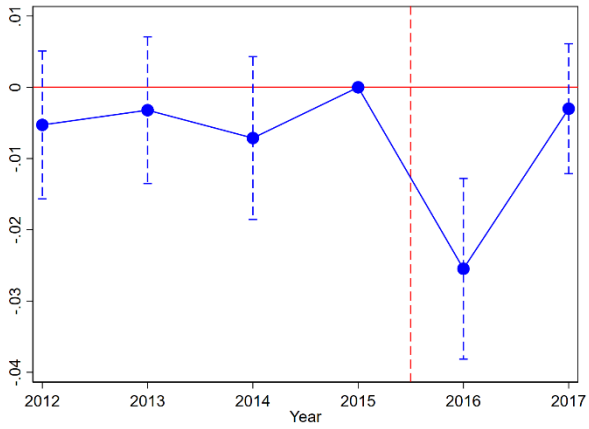


Figure A2: Frequency of All the Listed Reasons for Not Planning to Have (More) Children

Notes: Each respondent could select up to three of these options as her primary reason for not planning to have (more) children, thus the cumulated frequency exceeds one.

Panel A: Event Study for the Triple-difference Term



Panel B: Event Study for the Treatment Indicator

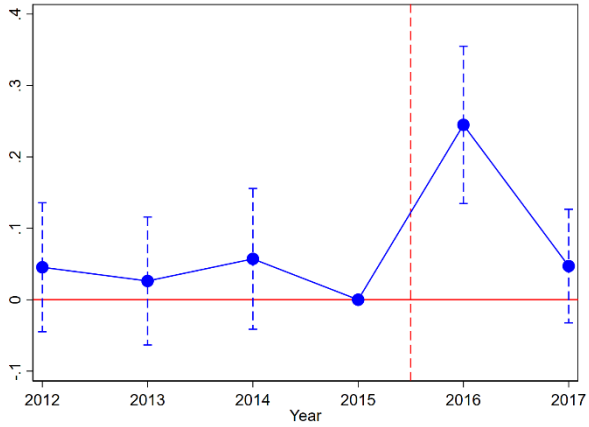


Figure A3: Event Study Results for Housing Price

Notes: This figure presents event study results using average housing price in log to measure location-specific childbearing cost at the county-level, where Panel A and Panel B depict event study graphs for β_2 and β_1 in Equation (3), respectively.

Table A1: Determinants of Chinese Women's Fertility Desires (OLS)

	(1)	(2)	(3)	(4)
Dep. Var.	Desired number of children			
Sample	Full Sample	With no living children	With one living child	With two or more living children
Housing price (log)	-0.0314***	-0.0393***	-0.0324***	-0.00340
	(0.0110)	(0.0135)	(0.00968)	(0.0154)
Per capita GDP (log)	-0.125***	-0.0641***	-0.0697***	-0.105***
	(0.00917)	(0.0110)	(0.00749)	(0.0114)
Family income (log)	-0.0170***	0.0217***	0.0100**	-0.0325***
	(0.00377)	(0.00731)	(0.00442)	(0.00501)
Urban *Hukou*	-0.152***	-0.0512***	-0.0691***	-0.0477***
	(0.00685)	(0.0132)	(0.00723)	(0.00932)
# of siblings	0.0476***	0.0417***	0.0224***	0.0336***
	(0.00270)	(0.00744)	(0.00310)	(0.00323)
Observations	89,678	14,925	35,956	38,787
Dep. Mean	1.828	1.593	1.451	2.268
Num. of Clusters	2,611	2,324	2,577	2,557
Controls	Yes	Yes	Yes	Yes

Notes: Controls include fixed effects on province, age, ethnicity, and categories of education levels. Standard errors are clustered at the county level. *, **, and *** denote significance at 10%, 5%, and 1% respectively.

Table A2: Evidence on the Irrelevance Between Women's Fertility Desires and Reaction to the UTC Policy

	(1)	(2)
Dep. Var.	To what extent do the UTC affect your fertility desire	
$I^{Fertility\ desire=1}$	0.0989	0.0631
	(0.273)	(0.288)
$I^{Fertility\ desire=2}$	-0.380	-0.464
	(0.271)	(0.285)
$I^{Fertility\ desire=3}$	-0.126	-0.340
	(0.272)	(0.287)
$I^{Fertility\ desire\geq 4}$	0.0687	-0.218
	(0.284)	(0.300)
$I^{Fertility\ desire=5}$	0.0265	-0.326
	(0.366)	(0.390)
$I^{Fertility\ desire\geq 6}$	0.260	-0.0733
	(0.409)	(0.417)
Observations	15,152	15,152
Province FE	No	Yes
Age FE	No	Yes
Ethnicity FE	No	Yes
Education category FE	No	Yes

Notes: This table presents the results of estimating an ordered Probit model. The dependent variable, to what extent do the UTC affect your fertility desire, has three categories, 1= "It has a great impact and I don't want to have another child before the UTC policy", 2= "It has a certain impact and I hesitate to have another child before the UTC policy", 3= "the policy has no impact". The group desire=0 is omitted as the reference group. Standard errors are clustered at the county level. *, **, and *** denote significance at 10%, 5%, and 1% respectively.

Table A3: Robustness Checks

Robustness Checks	(1) Using more Sparse Controls	(2) Controlling for husband's attributes	(3) Using women aged 20–49	(4) Eliminating ethnic minorities	(5) Eliminating women in the treatment group who gave birth to their first child in 2014–15	(6) Eliminating women who gave birth to their first child in 2014–15	(7) Considering confounding effects of the "Single-Only" RTC policy	(8) Alternative outcome variable
Dep. Var.	Number of Births							Number of Pregnancies
Treat	0.0206***	0.00310**	0.0108***	0.00289*	0.0146***	0.00502***	0.00371**	0.00977***
	(0.00154)	(0.00157)	(0.00105)	(0.00164)	(0.00159)	(0.00152)	(0.00150)	(0.00259)
Treat × $\boldsymbol{I}^{High\ desire}$	0.0218***	0.0249***	0.0102**	0.0245***	0.0495***	0.0212***	0.0274***	0.0219***
	(0.00498)	(0.00481)	(0.00451)	(0.00502)	(0.00502)	(0.00544)	(0.00468)	(0.00555)
Dep. Mean	0.0801	0.0801	0.0518	0.0795	0.0728	0.0591	0.0709	0.111
Observations	201,972	201,822	314,358	187,686	190,590	170,412	190,722	201,948
Num. of Clusters	2,529	2,527	2,556	2,401	2,495	2,462	2,510	2,529
Individual FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province-by-Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls × Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: $\boldsymbol{I}^{High\ desire}$ is a dummy variable denoting women whose desired fertility was two or above. In Column 1, controls only include age dummies. In Columns 3–8, controls include dummies on age, ethnicity, categories of education levels, and having an urban *Hukou*. In Column 2, controls include dummies on both husband and wife's age, ethnicity, categories of education levels, and having an urban *Hukou*. Standard errors are clustered at the county level. *, **, and *** denote significance at 10%, 5%, and 1% respectively.

Table A4: Supportive Evidence on Housing Price as a Proxy for the Childrearing Cost

	(1)	(2)	(3)
Dep. Var.	Log(cost of childbirth when giving birth to this child)	Log(average monthly cost of kindergarten/nursery that you can afford)	Log(average monthly cost of kindergarten/nursery the last three months)
Survey Sample	Women with children under one year of age	Women with children under six years of age	Women with children under six years of age who had entered kindergarten/nursery
Housing price (log)	0.149***	0.257***	0.272***
	(0.0286)	(0.0246)	(0.0278)
Per capita GDP (log)	0.133***	0.144***	0.122***
	(0.0197)	(0.0146)	(0.0176)
Family income (log)	0.0519***	0.218***	0.119***
	(0.00994)	(0.00676)	(0.00860)
Urban *Hukou*	0.0790***	0.192***	0.217***
	(0.0195)	(0.0120)	(0.0167)
# of siblings	-0.0316***	-0.0225***	-0.0177***
	(0.00752)	(0.00388)	(0.00508)
Years of schooling	0.139***	0.462***	0.478***
(log)	(0.0319)	(0.0166)	(0.0235)
Observations	9,719	41,128	18,853
Dep. Mean	8.405	6.212	6.309
Num. of Clusters	2,297	2,592	2,473
Controls	Yes	Yes	Yes

Notes: Controls include fixed effects on province, age, nationality, and categories of education levels. Standard errors are clustered at the county level. *, **, and *** denote significance at 10%, 5%, and 1% respectively.

Appendix B: Special Provisions on Birth Quotas in Various Provinces Before the Implementation of the Universal Two-Child Policy

This appendix provides a detailed list of the special provisions on birth quotas issued by each provincial government that were considered in our analysis. They had been permitted to have a second child (or more children) even before the RTC policy, which were referred to as "exceptional cases" in Table 2.

Throughout all provinces, couples could apply to have a second child if one spouse was an only child and they only had one child according to the "*Single-Only*" Two-Child policy.

Beijing: Couples could apply to have a second child if they were rural residents living in remote mountainous areas primarily depended on agricultural production for their livelihood and had only one daughter. Approved second child births had to be spaced at least four years apart, or the mother had to be at least 28 years old.

Tianjin: Residents could request to have a second child if the wife was a rural resident, or if farmers in mountainous or semi-mountainous areas with a labor shortage had only one daughter. Approved second child births had to be spaced at least four years apart, except when the mother was at least 28 years old.

Hebei: Couples could have a second child if both spouses belonged to ethnic minorities with a national population of less than ten million and they only had one child; or if rural residents in mountainous or plateau areas had only one child, and those in plains or hilly areas had only one daughter. Women had to be at least 26 years old, and second child births had to be spaced at least four years apart, except if the woman was at least 28 years old.

Shanxi: Couples could have a second child if both spouses were ethnic minorities or returned overseas Chinese; or if both spouses were rural residents and had only one daughter. The provincial population and family planning administrative department could approve a second child for policy pilots, scientific research, or other special circumstances.

Inner Mongolia: Couples could have a second child if both spouses were rural residents engaged in farming or herding, with one child being a daughter; or if one spouse was an only child. Mongolian couples were allowed to have two children. If both spouses were rural residents engaged in farming or herding, with two daughters, they could be approved for a third child. Daur, Ewenki, and Oroqen couples were encouraged to have fewer children but there were no explicit birth quotas imposed on them. Other ethnic minorities with a national population of less than ten million could have two children. Couples from different ethnic backgrounds could choose which ethnic group's birth policy to follow.

Liaoning: Couples with one child could have a second child if both spouses were ethnic minorities and the wife was a rural resident; if both spouses were rural residents and one was from a nationally recognized small population ethnic minority (i.e., with a national population of less than 300,000); or if the wife was a rural resident and had only one daughter.

Jilin: Couples could have a second child if both spouses were from ethnic minorities with a national population of less than ten million. If both spouses were rural residents, they could have a second child if their first child was a daughter or if they lived in national border areas.

Heilongjiang: Couples legally married and having one child could have a second child if both spouses were rural residents with only one daughter or if both spouses were rural residents in national border areas with only one child. Couples from ethnic minorities with a national population of less than ten million, as well as couples where one spouse belonged to the Oroqen, Ewenki, Hezhe, Daur, or Kyrgyz ethnic groups, could have a second child after having one. Couples where both spouses belonged to the Oroqen, Ewenki, Hezhe, Daur, or Kyrgyz ethnic groups could have a third child after having two.

Shanghai: Couples with no children before marriage could request to have a second child after their first child if one spouse was an only child.

Jiangsu: Couples where the wife was a rural resident could apply to have a second child under the following conditions: if the husband had no brothers and only one sister and they had only one daughter. Eligible couples could apply to have a second child after the wife turned 24.

Zhejiang: Couples could have a second child if both spouses were rural residents and already had one daughter, excluding those where one spouse worked for government agencies, organizations, institutions, or other organizations for more than one year, or both had established labor relations with an enterprise for more than one year; if both spouses were ethnic minorities and already had one child; or if both spouses were rural residents, one spouse was an ethnic minority with household registration in the province for more than two generations, and they already had one child.

Anhui: Couples could apply to have a second child if both spouses were ethnic minorities and had only one child; or if rural couples had only one daughter.

Fujian: Couples where both spouses were rural residents and had one child could apply to have a second child if they had only one daughter. Ethnic minority couples could have two children if both spouses were rural residents, or if they lived or worked in ethnic minority townships or villages for five years. Couples where both spouses were only children could also apply to have a second child. If one spouse was Han Chinese and the other was an ethnic minority, and the Han Chinese spouse resided in the ethnic minority area for more than five years and their children were considered ethnic minorities according to relevant regulations, they could follow the same provisions.

Jiangxi: Couples could have a second child if their only child had died; or if both spouses were ethnic minorities living in ethnic minority areas designated by county-level governments and had only one child. If one spouse was an urban resident and the other was a rural resident, they followed the family planning policies for urban residents.

Shandong: Couples could apply for a second child if both spouses were ethnic minorities. Rural couples who depended primarily on income from agriculture, forestry, animal husbandry, or fishing, and who had one daughter, where both the mother and daughter were rural residents and the mother had lived in rural areas for more than five consecutive years, could apply for a second child.

Henan: Rural couples could apply for a second child if they had only one daughter or if both spouses were ethnic minorities. However, if their household registration originally was urban but later transferred to rural, or if rural residents were employed as state officials, these provisions did not apply, except for those who transferred from urban to rural through lawful marriage.

Hubei: Rural couples could apply for a second child if they had only one daughter or if both spouses were ethnic minorities. These provisions did not apply to state officials. If one spouse was an urban resident and the other was a rural resident, they followed the family planning policies for urban residents.

Hunan: Rural couples with only one child could apply for a second child if that child was a daughter. If one spouse was an urban resident and the other was a rural resident, or if either or both spouses had transferred from urban to rural registration, they were not subject to certain provisions of the regulations. In ethnic autonomous regions as well as areas transferred from Xiangxi Tujia and Miao Autonomous Prefecture to Zhangjiajie City, ethnic minority couples could apply for a second child.

Guangdong: Couples could apply for approval to have a second child if both were rural residents and had only one daughter. Ethnic minority couples living in autonomous counties or districts could apply for a second child if both were rural residents, if one spouse was rural and the other urban but had only one daughter, or if both were rural residents with one spouse being Han Chinese but residing in the minority spouse's household.

Guangxi: Couples could apply for approval to have a second child under the following conditions: if one spouse was an only child; if both spouses belonged to ethnic minorities with a population below ten million. If

the wife was a rural resident, she could apply for a second child if she had only one daughter. Specific exceptions included rural women who had left agricultural production, had lived and worked in urban areas for over five years, or had been employed as state officials.

Hainan: Rural residents could apply to have a second child. Rural residents in areas predominantly inhabited by ethnic minorities could have two children and couples with two daughters could apply for a third child. Urban residents in areas predominantly inhabited by ethnic minorities could apply to have a second child if one of the spouses belonged to ethnic minorities with a national population of less than ten million and they only had one child. Couples with mixed household registration (one urban, one rural) or mixed provincial registration followed the wife's household policy. Rural residents who had lived in urban areas for over a year or were employed by organizations followed urban policies.

Chongqing: Couples with one child could apply for a second if both spouses were ethnic minority rural residents. Additionally, rural couples in minority autonomous regions or designated mountainous areas, especially those with labor shortages, could apply. If the wife was under 28, a three-year birth gap was required before applying for a second child. Rural residents who had lived in urban areas for three years or more followed urban policies.

Sichuan: Rural residents in specific areas with labor shortages, especially those in high-altitude and remote mountainous areas, could apply to have a second child. People's congresses of autonomous prefectures and autonomous counties formulate their own birth policies based on the principles of this regulation and local actual conditions, which were subject to approval by the Standing Committee of the Provincial People's Congress.

Guizhou: Rural couples could apply for a second child if their first was a daughter, or if either spouse belonged to an ethnic minority.

Yunnan: Urban couples had one child by default. They could apply for a second child if either spouse was an only child or belonged to the Drung, De'ang, Jino, Achang, Nu, Pumi, Blang, or Jingpo ethnic groups. Rural residents hired as formal employees by state organs or organizations followed urban family planning policies. Rural couples could apply for a second child. Ethnic minority rural residents with two children could apply for a third if both spouses resided in border village committees or belonged to the Drung, De'ang, Jino, Achang, Nu, Pumi, Blang, or Jingpo ethnic groups.

Shaanxi: Couples with one child could have a second child under the following conditions: if both spouses belonged to ethnic minorities with a national population under ten million; if both spouses were returned overseas Chinese. Rural couples could have a second child if they had only one daughter; if the husband married and registered at a household with only daughters; or if they lived in sparsely populated high-altitude areas.

Gansu: Rural couples could apply for a second child if they had only one daughter; if one spouse was an ethnic minority; or if the husband married into a family with only daughters and provided for the wife's elderly parents. In ethnic autonomous areas, couples could apply for a second child if one or both spouses were Dongxiang, Yugur, or Bonan urban residents with one child; or if both were rural residents with one spouse being Dongxiang, Yugur, Bonan, and residing in sparsely populated pastoral or forest areas, such as Tibetan, Mongolian, Salar, and Kazakh ethnic groups, and already had two children.

Qinghai: Urban couples could apply for a second child if one or both spouses were ethnic minorities; or if one or both were overseas Chinese or returned overseas Chinese. Rural ethnic minority couples could have two children. Pastoral ethnic minority couples could have three children. All these conditions required a minimum birth gap of four years.

Ningxia: Couples could apply for a second child if one or both spouses were ethnic minorities. Rural residents could have up to two children. Ethnic minority rural residents from eight specified mountainous counties (Yuanzhou, Haiyuan, Xiji, Longde, Jingyuan, Pengyang, Yanchi, Tongxin) could have up to three children. If one

spouse had household registration outside the autonomous region, they followed the birth policies of the wife's household registration area.

Xinjiang: Urban Han Chinese couples could have one child, while ethnic minority couples could have two. Han Chinese farmers and herders could have two children, and ethnic minority farmers and herders could have three. If one spouse was an ethnic minority, they followed policies for ethnic minorities; if one spouse was an urban resident, they followed urban policies. Couples could apply for a third child if both spouses were only children.

Xinjiang Production and Construction Corps: Han Chinese employees in the Corps organs and directly subordinate units could have one child, while ethnic minority employees could have two. If one spouse was an ethnic minority, they followed ethnic minority family planning policies; if one spouse was an urban resident, they followed urban family planning policies.